What is claimed is:

1. A system for diagnosing the quality of a reagent solution, comprising:

a reagent solution source for supplying the reagent solution to an emissions catalyst of an internal combustion engine;

means for determining a quality value corresponding to the quality of the reagent solution;

a first filter receiving the quality value and producing a first filtered quality value; and

a first comparator comparing the first filtered quality value to a first threshold and producing a fault value if the first filtered quality value crosses the first threshold.

2. The system of claim 1 wherein the first comparator is configured to further compare the first filtered quality value to a second threshold and produce the fault value if the first filtered quality value crosses the second threshold.

3. The system of claim 2 wherein the first and second thresholds define a first range of acceptable filtered quality value values therebetween;

and wherein the first comparator is configured to produce the fault value if the first filtered quality value is outside the first range of acceptable filtered quality value values.

4. The system of claim 1 further including:

a memory; and

a fault timer activating in response to the fault value and logging the fault value in the memory after expiration of the fault timer.

5. The system of claim 1 further including:

a fault lamp; and

a control circuit responsive to the fault value to illuminate the fault lamp.

6. The system of claim 1 further including:

a wireless transceiver; and

a control circuit responsive to the fault value to transmit the fault value to a remote receiver via the wireless transceiver.

7. The system of claim 1 further including:

a fuel system responsive to a fuel control signal to supply fuel to the engine; and

a control circuit responsive to the fault value to modify engine performance by modifying the fuel control signal.

8. The system of claim 1 further including a first control computer implementing the first filter and the first comparator in the form of one or more software algorithms.

9. The system of claim 8 further including a second control computer configured to manage overall operation of the engine; and

wherein the first control computer is configured to transfer the fault value to the second control computer via a communication link for conducting communications between the first and second control computers.

10. The system of claim 8 wherein the first control computer is further configured to manage overall operation of the engine.

11. The system of claim 1 further including:

a temperature sensor producing a temperature signal indicative of a temperature of the reagent solution; and

a threshold determining circuit determining the first threshold as a function of the temperature signal.

12. The system of claim 11 wherein the first comparator is configured to further compare the first filtered quality value to a second threshold and produce the fault value if the first filtered quality value crosses the second threshold;

and wherein the threshold determining circuit is configured to determine the second threshold as a function of the temperature signal.

13. The system of claim 12 wherein the first and second thresholds define a first range of acceptable filtered quality values therebetween;

and wherein the first comparator is configured to produce the fault value if the first filtered quality value is outside the first range of acceptable filtered quality value values.

14. The system of claim 13 further including:

a memory; and

a fault timer activating in response to the fault value and logging the fault value in the memory after expiration of the fault timer.

15. The system of claim 1 further including:

a number of the first filters each configured to receive the quality value and produce a different first filtered quality value;

a number of first comparators each configured to compare a corresponding one of the number of first filtered quality values to a different one of a corresponding number of first thresholds, and to produce the fault value if the first filtered quality value crosses the corresponding one of the number of first thresholds;

a temperature sensor producing a temperature signal indicative of a temperature of the reagent solution; and

a switching circuit supplying the quality value only to an appropriate one of the first filters as a function of the temperature signal.

16. The system of claim 15 wherein each of the number of first comparators is configured to further compare the first filtered quality value to a different one of a

number of second thresholds and to produce the fault value if the first filtered quality value crosses the corresponding one of the number of second thresholds.

17. The system of claim 16 wherein the first and second thresholds for each of the number of first comparators define a different one of a number of corresponding first ranges of acceptable filtered quality values therebetween;

and wherein each of the number of first comparators is configured to produce the fault value only if the first filtered quality value is outside a corresponding one of the number of first ranges of acceptable filtered quality value values.

18. The system of claim 17 further including:

a memory; and

a fault timer activating in response to the fault value and logging the fault value in the memory after expiration of the fault timer.

19. The system of claim 15 wherein the switching circuit is configured to produce a temperature range indicator corresponding to a temperature range within which the temperature signal falls.

20. The system of claim 19 further including a memory partitioned into a number of storage locations each corresponding to a different one of a corresponding one of a number of the temperature ranges;

and wherein the memory is configured to store the first filtered quality value in an appropriate one of the number of storage locations as a function of the temperature range indicator.

21. The system of claim 1 wherein the first filter is a long range averaging filter.

22. The system of claim 3 further including a second filter receiving the quality value and producing a second filtered quality value; and

a second comparator comparing the second filtered quality value to a third threshold and producing another fault value if the second filtered quality value crosses the third threshold.

23. The system of claim 22 wherein the second comparator is configured to further compare the second filtered quality value to a fourth threshold and produce the another fault value if the second filtered quality value crosses the fourth threshold.

24. The system of claim 23 wherein the third and fourth thresholds define a second range of acceptable filtered quality values therebetween;

and wherein the second comparator is configured to produce the another fault value if the second filtered quality value is outside the second range of acceptable filtered quality value values.

25. The system of claim 24 further including:

a memory; and

a fault timer activating in response to either of the fault value and the another fault value, and logging a corresponding fault indicator in the memory after expiration of the fault timer.

26. The system of claim 24 further including:

a fault lamp;

a fault timer activating in response to either of the fault value and the another fault value, and producing a corresponding fault indicator after expiration of the fault timer; and

a control circuit responsive to the fault indicator to illuminate the fault lamp.

27. The system of claim 24 further including:

a wireless transceiver;

a fault timer activating in response to either of the fault value and the another fault value, and producing a corresponding fault indicator after expiration of the fault timer; and

a control circuit responsive to the fault indicator to transmit the fault value to a remote receiver via the wireless transceiver.

28. The system of claim 24 further including:

a fuel system responsive to a fuel control signal to supply fuel to the engine; and

a control circuit responsive to the fault value to modify engine performance by modifying the fuel control signal.

29. The system of claim 24 further including a first control computer implementing the first filter and second filters and the first and second comparators in the form of one or more software algorithms.

30. The system of claim 29 further including a second control computer configured to manage overall operation of the engine; and

wherein the first control computer is configured to transfer the fault value to the second control computer via a communication link for conducting communications between the first and second control computers.

31. The system of claim 29 wherein the first control computer is further configured to manage overall operation of the engine.

32. The system of claim 22 wherein the second filter is a short range averaging filter.

33. The system of claim 22 further including:

a level sensor producing a level signal indicative of a level of the reagent solution within the reagent solution source; and

a third comparator comparing the level signal to a level threshold and producing an enable value if the level signal exceeds the level threshold, the system producing the fault signal only if the third comparator produces the enable value.

34. The system of claim 33 further including an enable timer receiving the enable signal and producing the enable signal only for a predefined time period.

35. The system of claim 22 further including:

means for producing a reagent solution quantity signal corresponding to a quantity of reagent solution in the reagent solution source; and

a third comparator comparing the reagent solution quantity signal to a refill threshold and producing an enable value if the reagent solution quantity signal exceeds the refill threshold, the system producing the fault signal only if the third comparator produces the enable value.

36. The system of claim 1 further including means for determining whether the reagent solution source has been refilled with the reagent solution;

wherein the system is operable to produce the fault signal only if the reagent solution source has been refilled with the reagent solution.

37. A system for diagnosing the quality of a reagent solution, comprising:

a reagent solution source for supplying the reagent solution to an emissions catalyst of an internal combustion engine;

means for determining a quality value corresponding to the quality of the reagent solution;

a first filter receiving the quality value and producing a first filtered quality value;

a second filter receiving the quality value and producing a second filtered quality value; and

a comparator comparing a difference between the first and second filtered quality value to a first threshold and producing a fault value if the difference crosses the first threshold.

38. The system of claim 37 wherein the comparator is configured to further compare the difference to a second threshold and produce the fault value if the difference crosses the second threshold.

39. The system of claim 38 wherein the first and second thresholds define a range of acceptable filtered quality values therebetween;

and wherein the comparator is configured to produce the fault value if the difference is outside the range of acceptable filtered quality value values.

40. The system of claim 37 further including:

a memory; and

a fault timer activating in response to the fault value and logging the fault value in the memory after expiration of the fault timer.

41. The system of claim 37 further including:

a fault lamp; and

a control circuit responsive to the fault value to illuminate the fault lamp.

42. The system of claim 37 further including:

a wireless transceiver; and

a control circuit responsive to the fault value to transmit the fault value to a remote receiver via the wireless transceiver.

43. The system of claim 37 further including:

a fuel system responsive to a fuel control signal to supply fuel to the engine; and

a control circuit responsive to the fault value to modify engine performance by modifying the fuel control signal.

44. The system of claim 37 further including a first control computer implementing the first and second filters and the comparator in the form of one or more software algorithms.

45. The system of claim 44 further including a second control computer configured to manage overall operation of the engine; and

wherein the first control computer is configured to transfer the fault value to the second control computer via a communication link for conducting communications between the first and second control computers.

46. The system of claim 44 wherein the first control computer is further configured to manage overall operation of the engine.

47. The system of claim 37 wherein the first filter is a long range averaging filter and the second filter is a short range averaging filter.

48. The system of claim 37 further including means for determining whether the reagent solution source has been refilled with the reagent solution;

wherein the system is operable to produce the fault signal only if the reagent solution source has been refilled with the reagent solution.

49. The system of claim 37 further including:

a temperature sensor producing a temperature signal indicative of a temperature of the reagent solution; and

a threshold determining circuit determining the first threshold as a function of the temperature signal.

50. The system of claim 49 wherein the comparator is configured to further compare the difference to a second threshold and produce the fault value if the difference crosses the second threshold;

and wherein the threshold determining circuit is configured to determine the second threshold as a function of the temperature signal.

51. The system of claim 50 wherein the first and second thresholds define a range of acceptable difference values therebetween;

and wherein the comparator is configured to produce the fault value if the difference is outside the range of acceptable difference values.

52. The system of claim 51 further including:

a memory; and

a fault timer activating in response to the fault value and logging the fault value in the memory after expiration of the fault timer.

53. The system of claim 37 further including:

a number of the first filters each configured to receive the quality value and produce a different first filtered quality value;

a number of the second filters each configured to receive the quality value and produce a different second filtered quality value;

a number of the comparators each configured to compare a difference between corresponding ones of the number of first and second filtered quality values to a different one of a corresponding number of first thresholds, and to produce the fault value if the corresponding difference crosses the corresponding one of the number of first thresholds;

a temperature sensor producing a temperature signal indicative of a temperature of the reagent solution; and

a switching circuit supplying the quality value only to an appropriate one of the first and second filters as a function of the temperature signal.

54. The system of claim 53 wherein each of the number of comparators is configured to further compare a corresponding one of the differences to a different one of a corresponding number of second thresholds, and to produce the fault value if the

corresponding difference crosses the corresponding one of the number of second thresholds.

55. The system of claim 54 wherein the first and second thresholds for each of the number of comparators define a different one of a number of corresponding ranges of acceptable difference values therebetween;

and wherein each of the number of comparators is configured to produce the fault value only if the corresponding difference is outside a corresponding one of the number of ranges of acceptable difference values.

56. The system of claim 55 further including:

a memory; and

a fault timer activating in response to the fault value and logging the fault value in the memory after expiration of the fault timer.

57. A system for diagnosing the quality of a reagent solution, comprising:

a reagent solution source for supplying the reagent solution to an emissions catalyst of an internal combustion engine;

means for determining a quality value corresponding to the quality of the reagent solution;

a diagnostic circuit processing the quality value and producing a fault value if the quality of the reagent solution sufficiently deviates from an expected quality value;

a temperature sensor producing a temperature signal indicative of a temperature of the reagent solution within the reagent source; and

an enabling circuit disabling operation of the diagnostic circuit if the temperature signal indicates that the temperature of the reagent solution is less than a first predefined temperature.

58. The system of claim 57 further including a heater for heating the reagent solution within the reagent source;

and wherein the enabling circuit is configured to activate the heater if the temperature signal indicates that the temperature of the reagent solution is less than the first predefined temperature.

59. The system of claim 58 wherein the enabling circuit is configured to monitor the temperature signal after activating the heater, and to deactivate the heater and enable operation of the diagnostic circuit if the temperature signal indicates that the temperature of the reagent solution is greater than a second predefined temperature that is greater than the first predefined temperature.

60. The system of claim 59 further including a timer;

wherein the enabling circuit is configured to enable the timer after activating the heater if the temperature signal indicates that the temperature of the reagent solution is greater than the second predefined temperature, and to deactivate the heater and enable operation of the diagnostic circuit only after the timer times out.

61. The system of claim 60 further including a control computer implementing the diagnostic circuit, the enabling circuit and the timer in the form of one or more software algorithms.

62. The system of claim 59 further including a level sensor producing a level signal indicative of a level of a liquid portion of the reagent solution within the reagent solution source;

and wherein the enabling circuit is configured to monitor the level signal after activating the heater if the temperature signal indicates that the temperature of the reagent solution is greater than the second predefined temperature, and to deactivate the heater and enable operation of the diagnostic circuit only if the level signal indicates that the level of the liquid portion of the reagent solution is greater than an expected liquid level.

63. The system of claim 59 wherein the enabling circuit is configured to monitor the quality value after activating the heater if the temperature signal indicates that the temperature of the reagent solution is greater than the second predefined temperature, and to deactivate the heater and enable operation of the diagnostic circuit only if the quality value has not changed more than a threshold amount over a predefined time period.

64. The system of claim 59 further including a control computer implementing the diagnostic circuit and the enabling circuit in the form of one or more software algorithms.

65. A system for diagnosing the quality of a reagent solution, comprising:

a reagent solution source having an outlet for supplying the reagent solution to an emissions catalyst of an internal combustion engine;

a heater, positioned near the reagent solution source outlet, for heating the reagent solution within the reagent solution source;

a concentration sensor positioned near the reagent solution source outlet and producing a concentration signal indicative of a concentration of reagent in the reagent solution near the reagent solution source outlet;

a temperature sensor positioned near the reagent solution source outlet and producing a temperature signal indicative of the reagent solution near the reagent solution source outlet;

a diagnostic circuit producing a fault value if the quality of the reagent solution deviates from an expected quality value by at least one threshold value; and

a threshold modification circuit activating the heater if the temperature signal indicates that the temperature of the reagent solution is less than a first predefined temperature, and modifying the at least one threshold value as a function of the concentration signal when a minimum amount of liquid reagent solution becomes available after activating the heater.

66. The system of claim 65 wherein the threshold modification circuit is configured to determine an available amount of liquid reagent solution as a function of the temperature signal after activating the heater, and to determine that the minimum amount of liquid reagent solution is available if the available amount of liquid reagent solution exceeds a minimum amount of liquid threshold.

67. The system of claim 65 further including a heater timer;

and wherein the threshold modification circuit is configured to reset a time value of the heater timer when activating the heater, and to determine an available amount of liquid reagent solution as a function of the time value, the threshold modification circuit determining that the minimum amount of liquid reagent solution is available if the available amount of liquid reagent solution exceeds a minimum amount of liquid threshold.

68. The system of claim 65 further including a control computer implementing the diagnostic circuit and the threshold modification circuit in the form of one or more software algorithms.

69. The system of claim 65 further including a dosing circuit responsive to a dosing control signal to supply the reagent solution to the emissions catalyst;

and wherein the threshold modification circuit is configured to modifying the dosing control signal as a function of the concentration signal when the minimum amount of liquid reagent solution becomes available after activating the heater.

70. The system of claim 69 further including a control computer implementing the diagnostic circuit, the threshold modification circuit and the dosing circuit in the form of one or more software algorithms.

71. A system for diagnosing the quality of a reagent solution, comprising:

a reagent solution source for supplying the reagent solution to an emissions catalyst of an internal combustion engine;

means for producing a quantity signal corresponding to a quantity of reagent solution within the reagent solution source;

a temperature sensor producing a temperature signal indicative of a temperature of the reagent solution within the reagent solution source;

a diagnostic circuit producing a fault value if the quality of the reagent solution deviates from an expected quality value by at least one threshold value;

an aging timer having a time value; and

a threshold modification circuit resetting the time value of the aging timer if the quantity signal indicates that the reagent solution source has been refilled, the threshold modification circuit thereafter determining an aging value as a function of the time value of the aging timer and the temperature signal and modifying the at least one threshold value as a function of the aging value.

72. The system of claim 65 further including a control computer implementing the diagnostic circuit, the threshold modification circuit and the aging timer in the form of one or more software algorithms.